OPTIONS PILOT PROGRAM

Issues and Strategies

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OPP Surveys

You recently received a 3-page survey requesting information about your participation in the 1994 Options Pilot Program. We cannot emphasize enough the importance of your response to that survey. We believe that the concept of the OPP will be continued in the 1995 Farm Bill. If a program is to be properly designed, it is necessary to have your input. Many of you have completed the survey and we appreciate your timely response. If you have not completed the survey, please take a few minutes to do so.

Loan Rate Alternative for Corn and Soybeans

For producers who enrolled corn and/or soybeans in the loan rate alternative of the OPP and have not placed those bushels in the Commodity Credit Corporation loan program or received a loan deficiency payment on those bushels, the opportunity still exists to buy March 1995 options as an alternative to the regular loan program. The required strike price is $5.25 for soybeans and $2.20 for corn.

Both the corn and soybean futures markets have traded in a very narrow range for an extended period of time. As a result of the low volatility and erosion of time, the underlying put option premiums have declined since early October. At this writing, $2.20 March corn puts had a premium of $.0225, while $5.25 March soybean puts had a premium of $.01. The major incentive for participating in the loan rate alternative is to capture the $.05 incentive payment. That payment can be captured by buying the option, selling the crop and then selling the option. At least one alternative to that might be considered to attempt to capture higher returns. This strategy is based on the assumption that futures prices will decline this winter and then rebound in the spring. This seems more likely for soybeans than for corn. If that pattern is followed, producers could buy options now, sell the corn or soybean, and hold the options in anticipation of lower prices and higher premiums. The risk of this strategy is very low and is especially attractive for crops that need to be sold this winter. If prices do decline this winter, reownership of the grain might be considered in anticipation of a spring recovery. [Good]

Pricing Commodity Options

A basic understanding of options premiums is important in making effective option hedging decisions. Option premiums are determined like futures, through open public outcry in trading pits at commodity exchanges.

The relationship between call prices and the underlying futures is positive with an inverse relation between the price of puts and the underlying futures. This relationship to futures prices is intuitive since the value of the right to assume a long (short) futures position appreciates (depreciates) with increases in the futures prices and vice versa.

Factors Influencing Option Values

An option premium has two components, normally referred to as the intrinsic and extrinsic value (or

time value). Intrinsic value is the positive difference between the strike price and the price of the underlying futures contract. Extrinsic or time value is the remainder of the premium which is not intrinsic value. Facts which affect the extrinsic value of an option include:

1. The relationship between the futures market and strike price.

For call options, the premium decreases as the strike price increases relative to the futures price. The exact opposite occurs for put options.

2. Interest rate.

The levels of interest rates and option premiums are inversely related. At higher interest rates, the return to interest-bearing investments increases, which means an increase in the opportunity cost of holding an option position. The competition between options and alternative investments will tend to decrease option premiums. The exact opposite occurs when interest rates are low.

3. Time to maturity of the option.

Everything else assumed equal, the more time an option has until expiration, the higher its premium. The underlying logic is that over a longer period, an unexpected event has a greater chance to develop, which would affect the futures price. Thus, buyers are willing to pay more for the longer term of protection. Likewise, sellers wish to receive a higher premium to compensate for the longer period of time.

4. The volatility of the underlying futures market.

Market volatility is a measure of the fluctuation of percentage return on a particular commodity over the next year. If everything remains equal, the premium would be higher if the volatility of the underlying futures market is greater. In times of high volatility, more price protection is necessary, and buyers of options are willing to pay more. Also, speculators will pay more because of the higher potential return resulting from a volatile market.

On the other hand, the seller will expect to receive more to justify the higher level of protection offered and to protect from an unfavorable price movements. Both puts and calls command higher premiums due to the higher volatilities in the underlying futures market.

In grains, the most important factor influencing option premiums is that of market volatility. Market volatility varies both within and between crop years. Within the crop year, market volatility increases when fundamental market conditions are uncertain.

The Black Pricing Model

Participants in the options markets can use many different pricing models to evaluate market-determined premiums. The most popular formula applied to commodities is that of Black, which is an adoption of the Black-Scholes stock option model. The Black model for calls is stated as:

$$C = e^{-rt} [\, UN(d_1) - EN(d_2)]$$

where

d_1	=	$[\ln (U/E) + (sd^2\, t)\ 2\ ] / sd\ \sqrt{t}$
d_2	=	$[\ln (U/E) - (sd^2\, t) / 2\ ]\ sd\ \sqrt{t}$
C	=	call premium
U	=	underlying futures price
E	=	exercise price
r	=	short-term interest rate
t	=	term to option expiration (in days)
sd	=	market volatility (standard deviation of market returns on annualized basis)
N	=	normal cumulative probability distribution
e	=	2.7183 (base of the natural logarithm)
ln	=	the natural log of the term

Puts are priced similarly as:

$$P = -e^{-rt} [\, UN(-d_1) - EN(-d_2)\ ]$$

The Black model makes the following assumptions:

1. The short-term interest rate is known and is constant through time.

2. The futures price follows a random walk in continuous time with a variance rate proportional to the square of the futures price. Thus, the distribution of possible futures prices at the end of any finite interval is log-normal. The variance rate of the returns on the futures contract is constant.

3. The option is not "European;" that is, it can be exercised any time before expiration.

4. Transactions costs are negligible.

5. There is no penalty to short selling.

The call premium decreases as the strike price increases (as the call goes from deep in-the-money to deep out-of-the-money), while the put premium increases as the strike price increases (as the put goes from deep out-of-the-money to deep in-the-money). When an option is deep in-the-money the premium equals the intrinsic value, and the extrinsic value is zero. This happens because a deep in-the-money option has so much protection against adverse price changes that the impacts of extrinsic variables are insignificant. The option premiums for both puts and calls have relationships and characteristics as expected.

The Delta can be derived from the Black model. It is represented as the term $N(d_1)$ for a call and $N(-d_2)$ for a put in the formula. When the underlying futures price changes, option premiums also fluctuate to reflect this movement. The rate at which the price of an option changes in relation to the price change of the underlying futures price is referred to as Delta. More specific, it represents the percentage change of an option's premium if the underlying futures price changes one percent.

Black premiums are an estimate of the fair market value of the option and are not necessarily equal to market premiums.

If you are going to trade options, or use them in relation to marketing decisions, it would be useful to obtain a software package for Blacks model and determine which options are over or under valued. The software can also be used to look at theoretical premiums with different levels of volatility. [Uhrig]

Reference: William W. Wilson, "Commodity Options," Chapter in Grain Marketing edited by Gail L. Cramer and Eric J. Wailes.

Issued by:

Darrel Good
University of Illinois

William Uhrig
Purdue University

Robert Wisner
Iowa State University

Art Barnaby
Kansas State University

George Flaskerud
N. Dakota State University

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Cooperative Extension Service
United States Department of Agriculture
University of Illinois
At Urbana-Champaign
Urbana, Illinois 61801